## Thomas Prevot

**From:** David H. Williams, LaRC [David.H.Williams@nasa.gov]
**Sent:** Monday, April 10, 2006 12:26 PM
**To:** Ev Palmer
**Cc:** Tom Prevot
**Subject:** MACS and ADRS software

Ev,

Regarding my use of the MACS and ADRS software.

The Multi-Aircraft Control System (MACS) and Aeronautical Data Radar Simulation (ADRS) software, written by Tom Prevot at NASA Ames, were crucial to the successful completion of two major simulation studies conducted at NASA Langley Research Center during 2004 and 2005. The simulation studies were sponsored by the Quiet Aircraft Technology (QAT) Project of the NASA Vehicle Systems Program. The subject of the experiments was evaluation of the NASA Low Noise Guidance (LNG) algorithms and pilot procedures under realistic terminal arrival scenarios.

The ADRS software was used to provide the data connection between a piloted high-fidelity flight simulator (the Langley B757 Cockpit Motion Facility) and air traffic provided by the Langley FMS-Autoflight Simulation Tools for Windows (FASTWIN) program reading a pre-recorded traffic file. The PC-generated traffic aircraft were used to provide the background traffic in the test scenarios for the piloted cockpit. The traffic aircraft were displayed to the pilots in the cockpit as both out-the-window visual targets as well as TCAS targets on the Navigation Display. The MACS software was used to provide an Air Traffic Control (ATC) display of the traffic, including the aircraft flown by the pilot test subjects, for use by a live ATC controller for issuing scripted communication with the test subjects. Proper timing and execution of the scripted communication required an accurate display of aircraft locations as depicted on a controller's radar screen. The combination of FASTWIN, ADRS and MACS provided this capability in a highly realistic manner.

The use of ADRS and MACS in these experiments resulted in a considerable savings in both time and resources for the QAT project. Alternative means of providing a traffic environment for the experiments would have required significant additional programming effort and would have resulted in a less realistic presentation to the test subjects. Our experience with ADRS and MACS has been extremely positive, and we intend to utilize the software in future experiments.

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